

# Determinant of adherence with health protocols of COVID-19 among market traders

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## Article Info

### Article history:

Received May 27, 2023

Revised Aug 15, 2023

Accepted Aug 26, 2023

### Keywords:

Adherence

COVID-19

Health protocol

Market

Traders

## ABSTRACT

Amid the COVID-19 pandemic, extensive restrictions were imposed on public facilities, including markets. Market traders and visitors were required to adhere with the health protocols government-established. This study's objective is to identify the factors influencing adherence with health protocols among traders. A cross-sectional survey was carried out in traditional and modern market located in Bogor Regency, Indonesia, from March to June 2022. The study encompassed all registered traders belonging to the traditional and modern market association. A total of 240 traders were chosen through a systematic random sampling method based on a hypothesis 2 test of population proportion. Primary data was gathered using a questionnaire and the research data were analyzed using binary logistic regression. In traditional markets, the majority of traders, about 65.0%, did not adhere with the health protocols, whereas in modern markets, approximately 71.7% of traders adhered to the protocols. The determinants of adherence to health protocols were knowledge ( $p=0.007$ ; OR=3.311; 95% CI=1.395-7.857) in traditional markets and perceived susceptibility ( $p=0.001$ ; OR=10.377; 95% CI=2.494-43.180) in modern markets. Knowledge and perceived susceptibility are determinant of market traders' adherence with health protocols. Enhanced adherence to health protocols can be achieved by boosting traders' understanding and awareness of COVID-19.

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## 1. INTRODUCTION

The emergence of the COVID-19 pandemic has necessitated governments to enact responses to combat this novel and severe respiratory infectious disease caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), resulting in the development of coronavirus disease 2019 (COVID-19) [1]. SARS-CoV-2 primarily spreads among humans through two modes of transmission: direct and indirect. Direct transmission occurs when individuals inhale respiratory droplets contaminated with SARS-CoV-2, typically through sneezing or coughing. Conversely, indirect transmission takes place when individuals come into contact with surfaces or objects contaminated by SARS-CoV-2-laden respiratory droplets and subsequently neglect to practice proper hand hygiene before touching their face, such as their mouth, nose, or eyes [2].

Traditional markets in Indonesia involve visitor mobility and high levels of social interaction due to the bargaining process [3]. These markets carry the risk of COVID-19 transmission through movements, crowds, and social interactions that can lead to physical contact [4]. Transmission of COVID-19 within the micro, small, and medium enterprise (MSME) sector, such as markets, can lead to health issues within the market community (including workers, managers, traders, and visitors). Additionally, traders face the risk of income loss as they are unable to conduct their business activities while infected [5].

Previous research indicates that traders and market managers have acknowledged and confronted the issue of the coronavirus, but their response has been less proactive. Training has not been effectively implemented. Meanwhile, buyers have been adhering to health protocols effectively due to their attainment of sufficient personal knowledge, attitudes, and responses [6]. The study by Usman *et al.* indicates that the majority of rural market traders have sufficient information about COVID-19. The general percentage scores for knowledge, attitudes, and practices are (75.57%, 82.6%, and 76.50%, respectively) [7].

As previously explained, there are several health values and benefits associated with adhering to public health measures such as wearing masks, washing hands with soap and running water, and maintaining a physical distance of 1-2 meters. The use of masks can help prevent inhaling large droplets and sprays, but its ability to filter out very small COVID-19 particles in the air is limited. The practice of hand hygiene is crucial in reducing the transmission of COVID-19 [8], [9]. According to the health belief model (HBM) theory, human behavior is influenced by four primary perceptions: the belief of being susceptible, the perception of the severity of a health issue, the perceived benefits of taking action, and the perceived barriers to taking that action. Furthermore, the model considers the belief in one's own ability to take action and external cues that prompt action, and all of these can be affected by diverse factors related to demographics, socio-psychological aspects, and structural factors [10].

HBM has been applied to describe a variety of health issues, ranging from preventive measures to behaviors related to complex disease conditions [11]. The potential of this model in explaining and predicting various behaviors related to positive health outcomes has been repeatedly investigated [12]. This model is also used in developing successful health communications, in which messages are structured according to HBM elements to change health behavior [13]. However, the capacity of each HBM component to predict various health behaviors varies significantly. In addition, the model's ability to explain community responses to newly emerging health problems still needs to be further explored [14]. As the COVID-19 pandemic surfaced and spread globally, scholars from different fields conducted research to understand why individuals were not adhering to COVID-19 preventive measures using the health belief model (HBM). Furthermore, several interventions have been implemented to mitigate the impact of the pandemic, with these interventions being designed based on the principles of the HBM.

Zewdie *et al.* [15] conducted a study revealing that the majority (87.5%) of research based on the health belief model demonstrated a strong ability to predict COVID-19 related behaviors. In summary, the health belief model accounted for a range of variance in behavior, spanning from 6.5% to 90.1%. Meanwhile, Shahnazi *et al.* [16] conducted research on assessing preventive health behavior related to COVID-19, utilizing the health belief model. Their findings suggest that self-efficacy and the perceived benefits significantly influence individuals' adherence with preventive behaviors against COVID-19. A similar investigation took place in Egypt, where the results highlighted that perceived susceptibility, benefits, barriers, and self-efficacy were all factors associated with behaviors aimed at preventing COVID-19 [17].

The HBM is a general conceptual framework and theoretical guide for health behavior in public health research introduced by Rosenstock. Individual motivation to carry out health behaviors including adherence to health protocols can be divided into three categories, namely modification factors, individual perceptions, and possible actions. The first factor is modification factors include demographic variables (age, gender, ethnicity, socioeconomic, and education), sociopsychological variables (personality, peer, and reference group pressure), and structural variable such as knowledge about the health impact of exposure to COVID-19 and how to prevent it. The second factor is individual perceptions are the factors that influence the perception of disease and the importance of health to the individual, perceived susceptibility, and perceived severity. In the HBM, individual perceptions play a pivotal role in predicting health behavior through six key variables: i) The model posits that individuals are more inclined to engage in healthy behaviors when they believe they are susceptible to negative health outcomes. ii) Furthermore, the model suggests that the stronger an individual perceives the severity of a negative health outcome, the more motivated they are to take action to prevent it. Susceptibility and severity are related to how individuals perceive the threat of negative health outcomes. iii) It is essential that individuals recognize that the desired behavior will yield significant positive benefits. iv) The HBM argues that if individuals perceive substantial barriers preventing them from adopting a preventive behavior, they are less likely to take that action. v) The model also assumes that individuals are more likely to engage in certain behaviors if they believe they are capable of carrying them out. vi) Finally, HBM incorporates cues to action, which are elements that encourage individuals to adopt preventive behaviors, along with additional factors. While the third factor is

action ability, which is the perceived benefits of antioxidants perceived resistance in taking recommended health actions. The combination of these factors causes a response that often manifests into the possibility of the behavior occurring [18], [19].

The ability of models to explain and predict behaviors associated with consistently positive health outcomes has been demonstrated. This model has also been used to develop many successful health communication interventions by framing messages into HBM variables for change health behavior. Previous studies have shown that the HBM theory is effective in explaining COVID-19 prevention behavior. This model can assist policy makers in planning and implementing interventions to improve COVID-19 prevention behavior such as adherence to health protocols [15], [18], [19]. Therefore, the study about determinants of adherence with health protocols among market traders in terms of HBM theory needs to be carried out. This research can strengthen the evidence to carry out efforts to prevent COVID-19, namely the behavior of adhering with health protocols by considering important constructs according to the HBM theory identified based on research results to prevent and control COVID-19.

## **2. METHOD**

### **2.1. Research design**

In this research, a quantitative methodology, specifically a cross-sectional study design is employed. Within this design, the study assesses adherence to COVID-19 preventive health protocols as the dependent variable. Simultaneously, sociodemographic characteristics, knowledge, and individual perceptions are considered as independent variables, all measured concurrently.

### **2.2. Research location and time**

The investigation took place in two types of markets: traditional and modern markets, situated within the Babakan Madang sub-district in Bogor Regency, West Java, Indonesia. In the Babakan Madang sub-district, there is one traditional market and one modern market, so these two markets are used as locations for this study. In the Babakan Madang sub-district, there is one traditional market and one modern market, so these two markets are the locations for this study. During the COVID-19 pandemic, the two markets were closed several times because there were traders who were exposed to COVID-19, there were even cases where traders who were exposed to COVID-19 also died due to comorbid illnesses. The research will be conducted during the period spanning from March to June 2022. A traditional market caters to a market share of the rural population. Therefore, its management, including building arrangement, cleanliness, and health protocol regulations, differs from that of a Modern Market managed by one of the housing units within a residential area's population share.

### **2.3. Population and sample**

The study's population comprises all traders registered in the Association of Traditional and Modern Market in Babakan Madang sub-district, Bogor Regency, West Java as of December 2021, a period marked by a significant surge in COVID-19 cases in Indonesia. There were 546 registered traders in the Babakan Madang traditional market association and 321 traders in the modern market. Sample size calculation employed a two-sample proportion test with a two-tailed alternative hypothesis, considering a 5% significance level and 90% power. P1, representing the proportion of respondents with positive individual perceptions who adhered to health protocols (49.5%), and P2, signifying the proportion of respondents with negative individual perceptions who still adhered to health protocols (76.0%), with an additional 10% allowance for potential participant attrition [20]. Consequently, the minimum required sample size was determined to be 110 traders for each market location, totaling 220 traders. Nonetheless, in this research, a complete of 240 traders (consisting of 120 in the traditional market and 120 in the modern market) who were officially registered and actively involved in vending, particularly allocated to the kiosks provided by the market manager, were incorporated. Eligible participants, meeting inclusion and exclusion criteria, were selected using a systematic random sampling technique. Inclusion criteria comprised individuals over 18 years old who were registered and regularly selling in the Association of Traditional and Modern Markets in Babakan Madang sub-district, capable of effective communication to facilitate data collection. Exclusion criteria encompassed traders who relocated to other markets, ceased selling, experienced severe illnesses including exposure to COVID-19 during data collection, or passed away during the data collection process. The recruitment procedure for the sample is depicted in Figure 1.

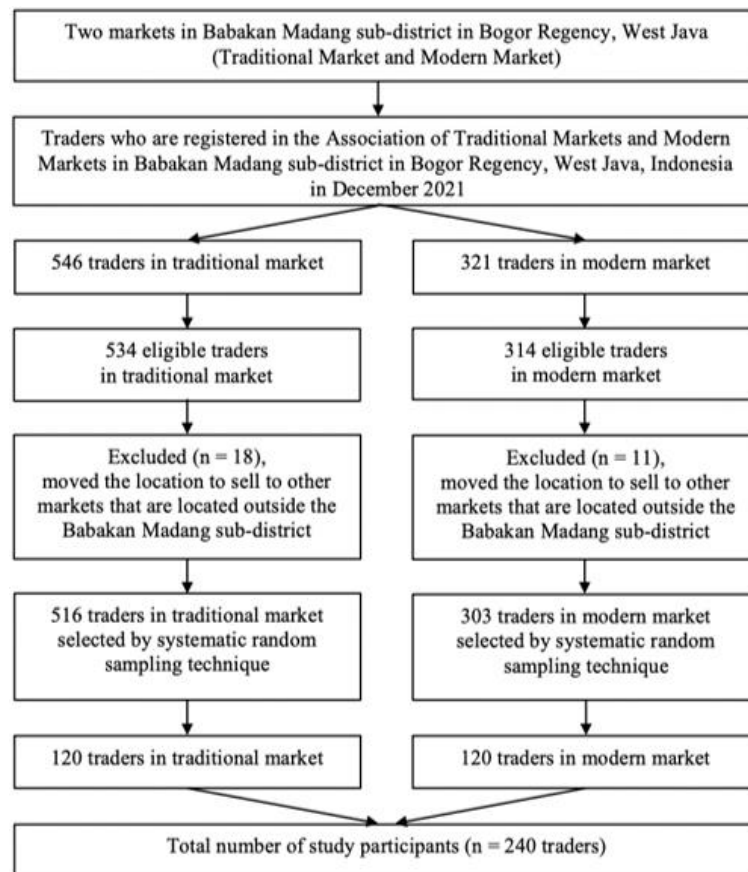


Figure 1. Sampling recruitment procedure

#### 2.4. Data collection stage

The primary data is gathered by employing a questionnaire as the principal research instrument, and respondents complete the questionnaire in person. The estimated time required for questionnaire completion is approximately ten minutes, preceded by a briefing on the research objectives and the acquisition of informed consent. The questionnaire comprises four main sections, encompassing demographic inquiries, questions concerning adherence to COVID-19 health protocols, an assessment of COVID-19 knowledge, and queries pertaining to the construction of the health belief model.

The demographic questionnaire solicits information on age, gender, and educational background. In the section pertaining to adherence to COVID-19 health protocols, seven questions are posed to assess traders' compliance. The section related to COVID-19 knowledge comprises 18 questions that cover various aspects, including the definition, causes, modes of transmission, symptoms, and prevention of COVID-19. The final part, which is dedicated to constructing the health belief model, consists of six sections of questions that pertain to perceived susceptibility (comprising six questions), perceived severity (comprising four questions), perceived benefits (with four questions), perceived barriers (consisting of six questions), self-efficacy (comprising six questions), and cues to action (consisting of six questions). Participants' responses to all questions in the section dedicated to constructing the health belief model are rated on a 4-point Likert scale, ranging from "strongly agree" to "strongly disagree," with corresponding scores ranging from 1 to 4. The questionnaire underwent a thorough evaluation, resulting in a calculated  $r$ -value falling within the range of 0.707 to 0.910, surpassing the  $r$ -table value of 0.336, which signifies its validity. Furthermore, the Cronbach Alpha value of 0.981 confirms the questionnaire's reliability for research purposes.

#### 2.5. Data analysis

The subsequent step aimed to identify the primary factors associated with traders' compliance with COVID-19 health protocols. This was achieved through multiple logistic regression analysis, again at a 95% confidence level (CI) and a 5% significance level ( $\alpha$ ). During this analysis, confounding variables, such as age and gender, were also considered to assess their impact on the relationship between the independent and dependent variables. The multiple logistic regression modeling results would determine which

independent variable exerted the most significant influence on traders' adherence to COVID-19. Subsequently, the study findings could be extrapolated or generalized based on these results. The data analysis was conducted utilizing SPSS software version 22.0.

## 2.6. Research ethics

This study has received ethical approval from the Health Research Ethics Committee at the Faculty of Public Health, Universitas Muhammadiyah Jakarta, as indicated by letter number 10.556.B/KEPK-FKMUMJ/VII/2022. The data collection process was conducted by six enumerators who were enrolled as students in the master's program in public health at the Faculty of Public Health. All enumerators were also graduates of a similar program during their undergraduate studies, namely in the public health study program. They are also practitioners who have worked as health workers who are experienced in conducting health research and collecting data in the community. In each market location (traditional market and modern market), assisted by one supervisor who is a graduate of the public health master's program to ensure the quality of the data collection process in accordance with established research procedures, and the data is collected completely. All enumerators and supervisors were given the same perception regarding the research being conducted and were trained in advance to ensure that the data collection process was standardized and carried out according to established procedures. In this investigation, the author affirms that all procedures adhere to the applicable guidelines and regulations, including those outlined in the Helsinki Declaration. It's important to note that this study does not involve experimental or intervention research.

## 3. RESULTS AND DISCUSSION

### 3.1. Characteristics, knowledge, and individual perception of traders in traditional and modern market

Based on the data, traditional market traders are predominantly in the 18-45 age group, accounting for 84.2%, while in modern markets, the proportion is lower at 59.2%. Both markets have more male traders than female traders. In traditional markets, 65.0% of traders do not adhere to health protocols, whereas in modern markets, the adherence rate is higher at 71.7%. When it comes to knowledge about COVID-19, traders in traditional markets mostly have limited knowledge, with 70.0% falling into this category. On the other hand, traders in modern markets exhibit better knowledge, with 56.7% having good knowledge. The perceived susceptibility to COVID-19 among traders is 71.7% in traditional markets and 65.0% in modern markets. Similarly, the perceived seriousness of COVID-19 is mostly considered serious by traders in both traditional (61.7%) and modern markets (60.8%). Regarding perceived benefits, traditional market traders mostly do not find them useful (60.0%), whereas modern market traders mostly find them beneficial (74.2%). The perceived barriers among traditional market traders are prevalent, with 70.0% experiencing them, while in modern markets, the majority (75.0%) do not perceive any barriers. In terms of perceived self-efficacy, traditional market traders mostly have poor self-efficacy (67.5%), while in modern markets, most traders (72.5%) are capable. As for cues to action, traditional market traders mostly do not have any signs (67.5%), while modern market traders mostly have cues to action (75.0%) as shown in Table 1.

In accordance with Kozier [21], adherence refers to individual actions, such as adhering to medication, following dietary guidelines, and making lifestyle modifications in line with therapeutic and health advice. Adherence is characterized as behavior influenced by societal expectations and can be evaluated by considering beliefs, acceptance, and actions. Belief indicates that the individual trusts that adhering to government recommendations will yield positive outcomes. Acceptance denotes that the individual acknowledges the conveyed message. Action signifies when the individual actually implements the recommended measures [22].

### 3.2. Determinants of adherence with health protocols among market traders

In traditional market, adherence to health protocols among traders is influenced by factors such as knowledge, perceived susceptibility, perceived benefits, and perceived barriers ( $p$ -value  $< 0.05$ ). On the other hand, in modern markets, adherence to health protocols among traders is associated with factors including age, gender, knowledge, perceived susceptibility, perceived seriousness, and perceived barriers ( $p$ -value  $< 0.05$ ) as presented in Table 2.

In traditional market, a significant correlation exists between traders' knowledge and their adherence to COVID-19 health protocols. These findings are consistent with a study conducted at the Ciputat Traditional Market in South Tangerang City, which also identified a link between knowledge and adherence to health protocols aimed at preventing COVID-19 transmission [23].

Table 1. Characteristics, knowledge, and individual perception of market traders

Variable	Traditional Markets		Modern Markets	
	Frequency	Percentage (%)	Frequency	Percentage (%)
Age (years)				
18-45	101	84.2	71	59.2
>45	19	15.8	49	40.8
Gender				
Male	84	70.0	76	63.3
Female	36	30.0	44	36.7
Adherence				
Adhere	42	35.0	86	71.7
Not adhere	78	65.0	34	28.3
Knowledge				
Good	36	30.0	68	56.7
Bad	84	70.0	52	43.3
Individual perception				
Perceived susceptibility				
Susceptible	86	71.7	78	65.0
Not susceptible	34	28.3	42	35.0
Perceived seriousness				
Serious	74	61.7	73	60.8
Not serious	46	38.3	47	39.2
Perceived benefits				
Beneficial	48	40.0	89	74.2
Useless	72	60.0	31	25.8
Perceived barriers				
Obstacles	84	70.0	30	25.0
Not obstacles	36	30.0	90	75.0
Perceived self-efficacy				
Capable	39	32.5	87	72.5
Not capable	81	67.5	33	27.5
Cues to action				
Sign	39	32.5	90	75.0
Not sign	81	67.5	30	25.0

Table 2. Determinant of adherence with health protocols among traders markets

Variable	Traditional market					Modern market				
	Adherence		Not adhere		p-value; OR (95% CI)	Adherence		Not adhere		p-value; OR (95% CI)
	N	%	N	%		N	%	N	%	
Age (years)										
18-45	33	32.7	68	67.3	0.294	57	80.3	14	19.7	0.014; 2.808 (1.241-6.352)
>45	9	47.4	10	52.6		29	59.2	20	40.8	
Gender										
Male	27	32.1	57	87.9	0.404	63	82.9	13	17.1	0.001; 4.425 (1.909-10.254)
Female	15	41.7	21	58.3		23	52.3	21	47.7	
Knowledge										
Good	20	55.6	16	44.4	0.003; 3.523 (1.555-7.980)	43	63.2	25	17.3	0.024; 2.778 (1.162-6.639)
Bad	22	26.2	62	73.8		77	82.7	9	36.8	
Perceived										
Susceptible	25	29.1	61	70.9	0.036; 2.440 (1.077-5.527)	38	90.5	4	9.5	0.001; 5.938 (1.924-18.321)
Not susceptible	17	50.0	17	50.0		48	61.5	30	38.5	
Perceived seriousness										
Serious	25	33.8	49	68.2	0.844	45	87.2	28	12.8	0.003; 4.252 (1.599-11.306)
Not serious	17	37.0	29	63.0		41	61.6	6	38.4	
Perceived benefits										
Beneficial	24	50.0	24	50.0	0.006; 3.000 (1.379-6.529)	61	68.5	28	31.5	0.250
Useless	18	25.0	54	75.0		25	80.6	6	19.4	
Perceived barriers										
Obstacles	18	50.0	18	50.0	0.036; 2.500 (1.116-5.602)	60	66.7	30	33.3	0.038; 3.250 (1.039-10.165)
Not obstacles	24	26.6	60	71.4		26	86.7	4	13.3	
Perceived self-efficacy										
Capable	13	33.3	26	66.7	0.840	61	70.1	26	29.9	0.652
Not capable	29	35.8	52	64.2		25	75.8	8	24.2	
Cues to action										
Sign	16	41.0	23	59.0	0.414	62	68.9	28	31.1	0.350
Not sign	26	32.1	55	67.9		24	80.0	6	20.0	

Within modern markets, there is a significant correlation between age, gender, knowledge, and traders' compliance with COVID-19 health protocols. According to Green's theory, gender serves as a predisposing or enabling factor that affects an individual's health-related behavior. Generally, women tend to display more favorable health behaviors in comparison to men. This trend can be attributed to women's increased awareness of environmental conditions and their overall health [24]. Similar findings were reported by Mortada *et al.* [25] where gender was found to be a significant predictor of COVID-19 behavioral intentions. Results from Passion *et al.* research indicate that engagement in protective behaviors tends to decrease with age, elderly individuals tend to view the risk as lower compared to middle-aged adults, while anxiety and the fear of mortality boost protective behaviors by increasing the perception of risk, particularly among middle-aged and younger individuals [26].

In traditional markets, adherence levels vary based on susceptibility, with lower susceptibility corresponding to lower adherence, and some traders exhibiting adherence despite a lower perceived susceptibility. In modern markets, the variable of higher susceptibility is associated with increased adherence, and even those who do not perceive susceptibility still exhibit higher adherence levels. A significant relationship is apparent between perceived susceptibility and the adherence of traders in both markets. Additionally, perceived susceptibility has been found to be significantly associated with increased adherence to social distancing measures in the United States [27].

Based on this analysis, it becomes evident that traders who perceive susceptibility are more likely to adhere to health protocols. To enhance awareness among traders, it is essential to bolster their understanding of the risks, consequences, and preventive measures related to COVID-19. This can serve as a reminder and boost adherence levels by disseminating acquired information to families and the local community. Increasing traders' knowledge can be accomplished through collaborative efforts between market social community groups, market managers, and grassroots healthcare providers in the area. The task of delivering information to market social groups need not be limited to healthcare professionals but can also involve influential figures such as association leaders or COVID-19 response teams.

In traditional markets, traders who perceive lower seriousness tend to be more adherent compared to those who are less adherent. Similarly, individuals who do not consider the situation as serious are less likely to be obedient compared to those who perceive it as less serious. However, in traditional markets, there isn't a significant association between the perceived seriousness of the situation and traders' adherence. This discovery is consistent with a study by Hansen *et al.* which determined that the perception of severity did not have a substantial impact on adherence with social distancing measures in the United States during the COVID-19 pandemic [28]. In modern markets, traders who perceive a higher level of seriousness are more adherent than those who perceive it as less serious. Conversely, those who do not consider the situation as serious are more obedient compared to those who perceive it as less serious. A significant correlation exists between the perceived gravity of the situation and traders' adherence in modern markets. This discovery corroborates previous research, which statistically proved that perceived severity is significantly associated with preventive actions against the COVID-19 pandemic [25], [29].

In traditional markets, adherence varies among traders who perceive the benefits, with those who perceive more benefits being more obedient and those who perceive fewer benefits being less obedient. However, among traders who do not find the benefits significant, those who perceive them as less significant are less adherent. Nevertheless, the perceived benefits by traders in traditional markets do not exhibit a significant relationship with adherence to COVID-19 health protocols. This is reminiscent of a study conducted in Rome, Italy, which found no significant correlation between perceived benefits and adherence. The effectiveness of the perceived message is enhanced when the benefits are concrete and meaningful for the overall health of the community [27].

In modern markets, traders who perceive more benefits are more obedient than those who perceive fewer benefits. Conversely, those who do not find the benefits significant are more obedient compared to those who perceive them as less significant. There is a notable association between perceived benefits and traders' adherence in both traditional and modern markets. The more significant benefits an individual perceives in controlling COVID-19 infection, the more committed they are to preventing COVID-19. This observation is supported by research indicating that perceived benefits have a significant relationship with individual adherence to preventive behaviors like maintaining social distance [30], [31]. Al-Sabbagh *et al.* affirm the existence of a notable connection between the perceived benefits and an individual's commitment to adhering to preventive measures such as maintaining physical distance from others [32]. Similarly, the systematic review carried out by Zewdie *et al.* highlights that the perceived benefit consistently emerges as the most common predictor of adherence to COVID-19-related measures and behaviors [15].

Believing in the advantages is a crucial aspect of influencing behavioral change, as per the HBM. These advantages serve as a means to indicate individuals' comprehension and emotional connection [33]. Based on researchers' analysis, there is a requirement for influential figures, such as the head of the association,

to take action in order to enhance traders' understanding of the benefits associated with implementing health protocols. This action aims to motivate traders to engage in a series of capacity-building activities, facilitated by market managers, focused on increasing their knowledge about COVID-19 and its prevention.

In traditional markets, the perception of barriers indicates that those who adhere to health protocols encounter fewer obstacles compared to those who do not adhere. Conversely, individuals who perceive fewer barriers exhibit lower adherence compared to those who perceive more barriers. In modern markets, the perception of barriers suggests that those who adhere to health protocols encounter fewer obstacles than those who do not adhere. Conversely, individuals who do not adhere encounter more barriers compared to those who adhere. A notable correlation is evident between the perceived barriers by traders and their adherence with health protocols, both in traditional and modern markets. This relationship indicates that lower perceived barriers to controlling COVID-19 infection are associated with a higher level of COVID-19 prevention. Consequently, effective and pragmatic education is necessary to enhance preventive health behavior against COVID-19 [30].

This is consistent with Shitu *et al.* research among school children, where respondents who perceived fewer barriers exhibited better preventive behavior against COVID-19. Statistically, there is a significant correlation between perceived barriers and COVID-19 prevention behavior [34]. Several studies rooted in the HBM have also identified perceived barriers as a key determinant of suboptimal adherence to COVID-19 prevention measures [17], [35], [36].

According to the HBM theory, individuals may take preventive actions influenced by existing obstacles, and the extent of these obstacles can act as negative factors for the individual [18]. The study's findings reveal a connection between the magnitude of perceived barriers and traders' adherence to health protocols. Traders who perceive fewer obstacles tend to be approximately 1.5 times more adherent to health protocols. In this study, perceived barriers confound the relationship between cues to action and adherence to health protocols.

Three factors play a role in behavior change: firstly, behavior change is more likely to happen when there is a willingness to take action and minimal obstacles in the way. Secondly, if an individual is not prepared to take action and faces substantial obstacles, the likelihood of adopting health behavior diminishes. Thirdly, when there is readiness to act but obstacles exist, behavior change can still happen in such cases, but it might be triggered by a heightened state of anxiety, or there might be no behavior change at all [37].

In traditional markets, the perceived self-efficacy among adherent traders is lower compared to those who exhibit less adherence. Conversely, they are perceived as less capable of maintaining adherence compared to those who adhere less. In modern markets, traders with a higher perceived self-efficacy tend to adhere more than those with less adherence, while those who perceive themselves as unable to adhere are more common among those with less adherence. However, the study results indicate that there is no significant association between self-efficacy and traders' adherence to COVID-19 health protocols in both markets.

The findings of this study suggest that traders with varying levels of self-efficacy exhibit similar levels of adherence, this is consistent with online studies conducted during the COVID-19 pandemic in Italy, which focused on increased compliance with health measures, especially personal protection. This study found that self-efficacy has a relatively limited impact on an individual's adherence to government-recommended health protocols, possibly because of the numerous government guidelines aimed at preventing COVID-19, resulting in varying outcomes. Additionally, the presence of authoritative adherence measures with written sanctions that are publicly announced may lead respondents to be hesitant in their responses, potentially affecting the self-efficacy factor [27].

In traditional markets, cues to action, indicated by signs or prompts, do not appear to significantly increase adherence compared to those who adhere less. Similarly, there is no discernible increase in adherence compared to those who exhibit less adherence. Among traders in modern markets, cues to action do not seem to substantially enhance adherence compared to those with less adherence, nor do they lead to a noticeable increase in adherence. The study did not find a significant relationship between cues to action and traders' adherence in both markets. Cues to action, as defined by Glanz *et al.* encompass events, individuals, or stimuli that encourage individuals to modify their behavior, including factors like relatives, friends, information source, and healthcare providers [38]. Earlier studies have shown comparable outcomes, suggesting that cues to action do not have a significant association with behaviors related to COVID-19 [39], [40].

The primary determinant for following health protocols in traditional markets is knowledge (OR=3.311; 95% CI=1.395-7.857). That traders possessing a solid understanding are three times more inclined to comply with health protocols compared to those with limited knowledge in traditional markets. Conversely, in modern markets, the dominant factor linked to adherence to health protocols is perceived susceptibility (OR=10.377; 95% CI=2,494-43,180). This implies that traders who perceive a high level of susceptibility are ten times more likely to adhere to health protocols than those who perceive themselves as less susceptible or not susceptible in modern markets as shown in Table 3.



Table 3. Multivariate analysis with binary logistic regression

Market	Variable	B	p-value	OR	95% CI
Traditional	Knowledge	1.197	0.007	3.311	1.395-7.857
	Perceived benefits	1.095	0.009	2.991	1.307-6.843
	Perceived barriers	0.916	0.040	2.500	1.044-5.987
Modern	Age	1.186	0.036	3.275	1.081-9.920
	Gender	1.463	0.008	4.317	1.469-12.692
	Knowledge	0.046	0.937	1.047	0.336-3.263
	Perceived susceptibility	2.340	0.001	10.377	2.494-43.180
	Perceived seriousness	1.622	0.008	5.063	1.530-16.758
	Perceived benefits	1.237	0.072	3.446	0.897-13.243
	Perceived barriers	1.782	0.017	5.943	1.382-25.548
	Cues to action	0.316	0.612	1.372	0.404-4.652

This study underscores the significance of knowledge as a determinant of adherence to COVID-19 health protocols in traditional markets. An investigation into the determinants of disease knowledge and behavior during the COVID-19 pandemic in Aceh revealed that knowledge plays a paramount role in shaping health behavior [41]. Similarly, research conducted in a rural market in Uganda found that the majority of traders possessed sufficient information about COVID-19, and this knowledge was positively associated with practices for COVID-19 prevention [7].

Throughout the pandemic, it is anticipated that enhancing awareness regarding health protocols in the market environment will boost traders' confidence in implementing the prescribed health measures for preventing the transmission of COVID-19. This can be achieved through various information dissemination methods, such as speakers, text messages, or outdoor advertising displays. Additionally, empowering traders and simplifying knowledge dissemination can enhance their understanding of COVID-19. Knowledge about COVID-19 encompasses a range of topics, including the symptoms of COVID-19, the possibility of asymptomatic transmission, and the importance of cleaning and disinfecting the environment, as recommended by WHO. Proper cleaning and disinfection are crucial in preventing COVID-19 transmission, as the virus can persist on surfaces and be transmitted when individuals touch contaminated surfaces and then their eyes, mouth, or nose without washing their hands with soap [1].

Knowledge is fundamentally the capacity to obtain, preserve, and apply information, shaped by one's experiences and competencies. Much of an individual's knowledge is derived from formal and informal education, personal experiences, their surroundings, and mass media. Actions represent the activities or behaviors a person engages in as responses or reactions to external stimuli, reflecting their knowledge and attitudes [42].

The abundance of information in the current age is bolstered by the internet and the convenience of obtaining information. However, the circulation of misinformation can significantly impact people's knowledge and subsequently their behavior. Decision-making and choices are increasingly influenced by information from the website, particularly on social networking platforms. A study conducted by Hidayati *et al.* demonstrates that individuals who acquire knowledge about COVID-19 from sources such as television, seminars, and social media tend to exhibit better COVID-19 prevention behaviors, and these factors are significantly correlated [43].

This study indicates that the determinant of adherence with COVID-19 health protocols in modern markets is perceived susceptibility. The results show that traders who perceive themselves as highly susceptible are ten times more likely to adhere with health protocols compared to traders who perceive themselves as less susceptible or not in the modern market. A study conducted in South Korea has identified a relationship between factors within the HBM and COVID-19 prevention measures. The results of this research indicate that perceived susceptibility has a positive effect on the implementation of preventive behavior. Therefore, it is crucial for the government and health authorities to provide trustworthy information regarding the pandemic status and guidelines for preventive behaviors. Additionally, the research findings also suggest that trusted information channels and reliable sources have a significant impact on preventive behaviors [44].

#### 4. CONCLUSION

The percentage of traders in traditional markets who adhere with health protocols is significantly lower (approximately half) compared to traders in modern markets. The most dominant factor influencing traders' adherence with health protocols to prevent the spread of COVID-19 in traditional markets is knowledge. Meanwhile, the most dominant factor influencing adherence to health protocols among traders in the modern market is the perception of susceptibility.

Continuous and extensive education through various health promotion media is necessary to enhance knowledge and foster positive individual perceptions regarding the importance of preventive behavior against COVID-19. This effort should be supported by strengthening multi-sectoral partnerships.

Market traders should actively engage and contribute to breaking the chain of COVID-19 transmission by adhering to health protocols, even as Indonesia enters a post-pandemic phase.

## ACKNOWLEDGEMENTS

We express our sincere gratitude to all the research participants. We also want to acknowledge the exceptional efforts of the data collectors and supervisors. We would like to thank the Directorate of Research, Technology, and Community Service, Directorate General of Higher Education, Research, and Technology, Ministry of Education, Culture, Research, and Technology (*KEMDIKBUDRISTEK*) of the Republic of Indonesia for their financial support and assistance in facilitating the execution of this research *PTM (Penelitian Tesis Magister)* under contract number 155/E5/PG.02.00/PT/2022.




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